

Claims

[c1] What is claimed is:

1.A method of defect root cause analysis comprising following steps:

providing a sample which comprises a plurality of defects;

performing a defect inspection to detect sizes and locations of the plurality of defects;

performing a chemical state analysis of the sample;

performing a mapping analysis according to a result of the chemical state analysis; and

analyzing the root cause of the defects according to a result of the mapping analysis.

[c2] 2.The method of claim 1 further comprising performing a defect classification after finishing the defect inspection for judging a defect type of the defects and performing a corresponding chemical state analysis according to the defect type of the defects.

[c3] 3.The method of claim 1 wherein an auger analysis is performed in the chemical state analysis when the defects are smaller than 0.2 μm or are not single phase particles.

- [c4] 4.The method of claim 3 wherein the auger analysis utilizes a scanning auger microscopy (SAM) or an auger electron spectroscopy (AES) to perform the chemical state analysis of the sample.
- [c5] 5.The method of claim 1 wherein an energy dispersive spectrometer (EDS) is utilized to detect in the chemical state analysis when the defects are equal to or larger than 0.2 μ m, single phase, or thick particles.
- [c6] 6.The method of claim 1 wherein the chemical state analysis comprises a point scan analysis, delayer analysis, and depth profile analysis.
- [c7] 7.A method of defect root cause analysis comprising following steps:
providing a sample with a plurality of defects;
performing a voltage contrast to identify locations of the defects;
cutting the sample with a focus ion beam (FIB) to expose a cross-section of the sample;
utilizing auger electrons to perform a chemical state analysis of the cross-section of the sample;
performing a mapping analysis according to a result of the chemical state analysis; and
judging a root cause of the defect generation according

to a result of the mapping analysis.

- [c8] 8.The method of the claim 7 wherein the method utilizes a scanning auger microscopy (SAM) or an auger electron spectroscopy (AES) to perform a chemical state analysis of the cross-section of the sample.
- [c9] 9.The method of claim 7 wherein the chemical state analysis comprises a point scan analysis.